

Lockheed Martin Corporation
Corporate Environment, Safety & Health
West Coast Projects Office
2550 North Hollywood Way, 3rd Floor, Burbank, CA 91505-1055
Facsimile 818-847-0256 or 818-847-0170



Via Federal Express
CAY0499/186
WBS# 48720

April 21, 1999

Mr. Gerard J. Thibeault
Executive Officer
California Regional Water Quality Control Board
Santa Ana Region
3737 Main Street, Suite 500
Riverside, California 92501-3339

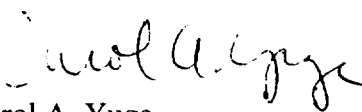
Dear Mr. Thibeault:

**Subject: March 1999 Data Report
 Water Supply Contingency Plan
 Production Well Sampling Program
 Crafton-Redlands Plume Project**

In compliance with the approved Water Supply Contingency Plan, enclosed please find one copy of the **March 1999, Production Well Sampling Program** report prepared by HSI-Geotrans for the Lockheed Martin Corporation. This report presents analytical results from samples collected at Bunker Hill Basin Production Wells in March of 1999. Laboratory Quality Assurance/Quality Control documentation is in Attachment C which is also enclosed for your review.

Should you have any questions, comments, or requests, please contact Tom Blackman at (818) 847-0791 or John Hemmans at (818) 847-0191.

Sincerely,


Carol A. Yuge

Enclosures

cc: See Attached Distribution List

Gerard Thibeault
April 21, 1999
CAY0499/186
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Distribution:

cc: (Abbreviated Report Without Attachments "A, B, & C" Which are Available Upon Request)
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Greg Snyder, City of Loma Linda
Joseph Stejskal, City of San Bernardino
Dieter Wirtzfeld, City of Riverside



HSI GEOTRANS

A TETRA TECH COMPANY

3150 Bristol Street
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April 23, 1999

Lockheed Martin Corporation
West Coast Project Office
2550 N. Hollywood Way, 3rd Floor
Burbank, California 91505

Attention: Mr. John Hemmans
Project Coordinator

Subject: March 1999 Data Report
Water Supply Contingency Plan
Production Well Sampling Program
Crafton-Redlands Plume Project

Dear Mr. Hemmans:

This report presents a summary of field procedures, protocols, and results of the Water Supply Contingency Plan production well sampling for the month of March 1999. The Water Supply Contingency Plan (WSCP) was prepared by Lockheed Martin Corporation and submitted to the State of California Regional Water Quality Control Board (RWQCB) Santa Ana Region on September 30, 1996. The plan was conditionally approved by the RWQCB in a letter dated March 6, 1997. The WSCP for the Crafton-Redlands Plume was prepared to address maintenance of water supply to purveyors in the event that wells became impacted with trichloroethene (TCE) from the Crafton-Redlands TCE Plume. A summary of key dates and WSCP sampling program evolution is provided on Table 1.

The locations of the WSCP wells and analytical results for the March 1999 sampling event for TCE and perchlorate are shown on Figures 1 and 2, respectively. Table 2 presents a summary of analytical tests performed on each WSCP well and water system sampling point. The sampling frequency of each well is once a month for the first year. More frequent sampling, if required, is based on the analytical results as outlined in the WSCP TCE and perchlorate decision matrices, provided as Figures 3 and 4, respectively. The perchlorate decision matrix was presented in the *Perchlorate Work Plan and Schedule*, which was submitted, to the RWQCB on August 15, 1997. The RWQCB approved the Perchlorate Work Plan on

October 31, 1997. Table 3 presents a summary of the wells sampled twice monthly according to the decision matrices.

RESULTS

A summary of the analytical results for the March 1999 WSCP sampling event for TCE and perchlorate is shown on Figures 1 and 2, respectively, and presented on Table 4. Available groundwater elevation data is provided on Table 5. Chain-of-custody and laboratory data sheets are in Attachment B and Level III QA/QC documentation is in Attachment C. Attachments A, B, and C are available upon request.

Trichloroethene

In March 1999, TCE was detected at or above the detection limit of 0.5 µg/L in four wells including; Gage 26-1 (12 µg/L), Gage 27-1 (10 µg/L), Gage 29-2 (2.5 µg/L and 3.4 µg/L), and Gage 92-1 (0.70 µg/L) as shown on Figure 1 and Table 4. Groundwater samples collected from the remaining WSCP wells and system sampling points did not detect TCE.

Three groundwater samples collected in March met or exceeded 2/5th the MCL for TCE (2.0 µg/L) including; Gage 26-1 (12 µg/L), Gage 27-1 (10 µg/L), and Gage 29-2 (2.5 µg/L and 3.4 µg/L). The TCE impacts at Gage 26-1 and Gage 27-1 are attributed to the Norton AFB plume, thus, more frequent TCE sampling will not be implemented. The TCE impacts at Gage 29-2 are wholly or partially attributed to the Norton AFB plume, thus, more frequent sampling will not be implemented.

Perchlorate

In March 1999, perchlorate was detected at or above the detection limit of 4 µg/L in two COLL wells (Mountain View #2 and Richardson #2), ten City of Riverside Gage wells (Gage 26-1, Gage 27-1, Gage 27-2, Gage 29-1, Gage 29-2, Gage 30-1, Gage 46-1, Gage 51-1, Gage 66-1, and Gage 92-1), one City of Riverside system sampling point (Gage Delivery) and one irrigation sampling point (Gage Arlington), as presented on Figure 2 and Table 4.

In the March WSCP sampling, perchlorate was detected at or above 75 percent (13.5 µg/L) of the PAL in one City of Riverside well (Gage 29-2). Gage 29-2 is currently being sampled on a twice a month basis.

Perchlorate: Twice-Monthly Sampling Evaluation

In accordance with the perchlorate decision matrix (Figure 4), if perchlorate is detected in any well at or above 75 percent (13.5 µg/L) of the PAL, and the

concentration is confirmed, the well is to be sampled on a twice-monthly basis (if active) for a period of three months. If at the conclusion of the three-month sampling cycle, the average perchlorate concentration is greater than or equal to 75 percent of the PAL, then the well will continue to be sampled on a twice-monthly basis for the next three-month sampling cycle. If the average perchlorate concentration is less than 75 percent of the PAL, then the well will be sampled once a month.

The three-month twice-monthly sampling cycle concluded on March 31, 1999. For the past three months (January 1 through March 31, 1999), the average perchlorate concentrations for the wells sampled on a twice-monthly basis are presented on Table 6. Three wells are currently being sampled on a twice a month basis, if active (Gage 29-2, Gage 29-3, and COLL Mountain View #2).

Four samples were collected from Gage 29-2 during the January 1 through March 31, 1999, three-month sampling cycle because the well was off-line part of the time. The average perchlorate concentration for samples collected from Gage 29-2 is 19.8 $\mu\text{g/L}$, thus, Gage 29-2 will continue to be sampled on a twice-monthly basis, if active.

Gage 29-3 was not sampled during the January 1 through March 31, 1999, three-month sampling cycle because the well was off-line. The average perchlorate concentration for the last three-month sampling cycle that Gage 29-3 was evaluated (July 1 through September 30, 1998) was 37.8 $\mu\text{g/L}$, thus Gage 29-3 will continue to be sampled on a twice-monthly basis, if active.

A total of five samples were collected from the COLL Mountain View #2 between January 1 and March 31, 1999 because the well was off-line part of the time. The average perchlorate concentration for the five samples analyzed from COLL Mountain View #2 is 10.3 $\mu\text{g/L}$ (Table 6). During the past three-month sampling cycle the average perchlorate concentration in Mountain View #2 was below 13.5 (75 percent of the PAL). In accordance with the WSCP decision matrix for perchlorate, Mountain View #2 should be sampled once a month, however, Lockheed Martin will continue to sample Mountain View #2 on a twice monthly schedule in accordance to the DHS-approved perchlorate blending plan for continued use of this well.

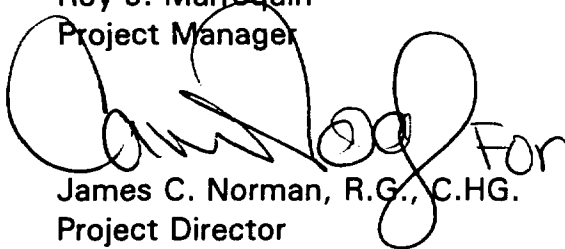
CLOSING

HSI GeoTrans greatly appreciates being of continued service to Lockheed Martin Corporation on this project. Should you have any questions or comments, please do not hesitate to call.

Sincerely,
HSI GEOTRANS

A handwritten signature in black ink, appearing to read "Roy J. Marroquin".

Roy J. Marroquin
Project Manager

A handwritten signature in black ink, appearing to read "James C. Norman".

James C. Norman, R.G., C.HG.
Project Director

TABLES

TABLE 1

KEY PROJECT DATES AND WSCP SAMPLING PROGRAM EVOLUTION

September 30, 1996, Lockheed Martin submitted the Water Supply Contingency Plan (WSCP) to the RWQCB – Santa Ana Region.
March 6, 1997, the RWQCB conditionally approved the WSCP, which included sampling eight production wells (City of Loma Linda Richardson #1, Richardson #2, Mountain View #1, Mountain View #2, Victoria Farms Mutual Water Company Wells #1 and #3, and Southern California Edison #1 and #2).
June 1997, Victoria Farms Mutual Water Company was connected to City of San Bernardino Water. Pumping ceased at VFMWC #1 and #3, and the two wells were removed from the program.
June 1997, sampling of SCE #1 was discontinued due to sampling logistics. The WSCP consists of five wells, including COLL Mountain View #1 and #2, COLL Richardson #1 and #2, and SCE #2 (AUX).
August 1997, the WSCP was expanded due to the detection of perchlorate in municipal supply wells in the Bunker Hill Basin. Twenty-six wells were added to the WSCP including nineteen City of Riverside wells, five City of Redlands wells, and two Loma Linda University wells, for a total of 31 wells.
October 1997, three City of Riverside water system sampling points were added to the WSCP, including the Gage system pipeline (Gage Delivery), the Waterman system pipeline (Iowa Booster), and the sampling station measuring outflow from the Linden and Evans Reservoirs (7 th & Chicago).
March 1998, two City of Loma Linda water system sampling points were added to the WSCP, including the Mountain View system pipeline (Mountain View Blend at Lawton) and the Richardson system pipeline (Richardson Blend).
June 1998, one City of Riverside irrigation water system sampling point (Gage Arlington) and one additional City of Loma Linda water system sampling point (Mountain View Blend at Timoteo) were added to the WSCP.
December 1998, COLL Richardson #3 Well Added to WSCP Sampling Program.

TABLE 2

WSCP PRODUCTION WELL SAMPLING PROGRAM

HSI#	Well Name	Perchlorate	TCE
City of Loma Linda			
692	Mountain View #2	X	X
693	Richardson #1	X	X
694	Richardson #2	X	X
707	Richardson #3	X	X
City of Loma Linda Water System Sampling Points			
2967	Mountain View Blend - Lawton	X	X
3016	Mountain View - Timoteo	X	X
2968	Richardson Blend	X	X
Southern California Edison			
554	SCE#2(AUX)	X	X
Loma Linda University			
267	LLUniv Anderson #2	X	
717	LLUniv Anderson #3	X	
City of Riverside (Gage System)			
252	Gage#26-1	X	X
258	Gage#27-1	X	X
259	Gage#27-2	X	X
260	Gage#29-1	X	X
219	Gage#29-2	X	X
220	Gage#29-3	X	X
218	Gage#30-1	X	X
214	Gage#31-1	X	X
215	Gage#46-1	X	X
253	Gage#51-1	X	X
216	Gage#56-1	X	X
257	Gage#66-1	X	X
644	Gage#92-1	X	X
641	Gage#92-2	X	X
642	Gage#92-3	X	X
City of Riverside (Waterman System)			
273	Hunt#6	X	
271	Hunt#10	X	
272	Hunt#11	X	
City of Riverside Water System Sampling Points			
2946	Iowa Booster (Waterman)	X	X
2947	Gage Delivery (Gage)	X	X
2948	7th & Chicago (Reservoir)	X	X
3018	Gage Arlington	X	
City of Redlands			
542	COR Church St ^{a)}	X	
2673	COR#38 ^{a)}	X	
535	COR Mentone Acres ^{a)}	X	
29	COR Orange st ^{a)}	X	
74	CORRees	X	X

Notes:

TCE = Trichloroethene

Perchlorate analyzed using DHS Method (EPA 300.0 Modified)

TCE analyzed using EPA Method 502.2

TABLE 3

**WSCP PRODUCTION WELL SAMPLING PROGRAM
MARCH 1999 WELLS SAMPLED TWICE MONTHLY**

HSI#	Well Name	Perchlorate	TCE
City of Loma Linda			
692	Mountain View #2	X	
City of Riverside (Gage System)			
219	Gage #29-2	X	
220	Gage #29-3	X	

Notes:

TCE = Trichloroethene

Perchlorate analyzed using DHS Method (EPA 300.0 Modified).

TCE analyzed using EPA Method 502.2.

In March Mountain View #2 was sampled once and Gage 29-3 was not sampled at all because the well was off-line.

TABLE 4
WSCP PRODUCTION WELL SAMPLING PROGRAM
MARCH 1999 DATA RESULTS

HS#	Well Name	Sample Date	Perchlorate (ppb) Del Mar	TCE (ppb) Del Mar
City of Loma Linda				
692	Mountain View #2	NS	NS	NS
692	Mountain View #2*	3/18/99	8.8	NA
693	Richardson #1	3/1/99	ND(4)	ND(0.5)
694	Richardson #2	3/1/99	6.3	ND(0.5)
707	Richardson #3	3/18/99	ND(4)	ND(0.5)
City of Loma Linda Water System Sampling Points				
2967	Mountain View Blend-Lawton	3/1/99	ND(4)	ND(0.5)
3016	Mountain View Blend-Timoteo	3/1/99	ND(4)	ND(0.5)
2968	Richardson Blend	3/1/99	ND(4)	ND(0.5)
Southern California Edison				
554	SCE#2(AUX)	3/3/99	ND(4)	ND(0.5)
Loma Linda University				
267	LLUniv Anderson #2	3/1/99	5.7	NA
717	LLUniv Anderson #3	3/1/99	5.2	NA
City of Riverside (Gage System)				
252	Gage#26-1	3/3/99	6.8	12
258	Gage#27-1	3/2/99	5.8	10
259	Gage#27-2	3/2/99	8.3	ND(0.5)
260	Gage#29-1	3/2/99	9.2	ND(0.5)
219	Gage#29-2	3/2/99	19	2.5
219	Gage 29-2*	3/18/99	21	3.4
219	MUN-735	3/18/99	21	3.5
220	Gage#29-3	NS	NS	NS
220	Gage#29-3*	NS	NS	NS
218	Gage#30-1	3/2/99	7.6	ND(0.5)
214	Gage#31-1	NS	NS	NS
215	Gage#46-1	3/2/99	5.1	ND(0.5)
253	Gage#51-1	3/2/99	12	ND(0.5)
216	Gage#56-1	3/2/99	ND(4)	ND(0.5)
257	Gage#66-1	3/2/99	9.4	ND(0.5)
644	Gage#92-1	3/2/99	12	0.70
644	MUN-733	3/2/99	13	0.69
641	Gage#92-2	3/2/99	ND(4)	ND(0.5)
642	Gage#92-3	3/2/99	ND(4)	ND(0.5)
City of Riverside (Waterman System)				
273	Hunt#6	NS	NS	NA
271	Hunt#10	NS	NS	NA
272	Hunt#11	NS	NS	NA
City of Riverside Water System Sampling Points				
2946	Iowa Booster (Waterman)	3/1/99	ND(4)	ND(0.5)
2947	Gage Delivery (Gage)	3/1/99	4.1	ND(0.5)
2948	7th & Chicago (Reservoir)	3/1/99	ND(4)	ND(0.5)
3018	Gage Arlington	3/1/99	4.2	NA
3018	MUN-732	3/1/99	4.2	NA
City of Redlands				
542	COR Church St ^a	NS	NS	NA
2673	COR#38 ^a	3/3/99	ND(4)	NA
2673	MUN-734	3/3/99	ND(4)	NA
535	COR Mentone Acres ^a	NS	NS	NA
29	COR Orange St ^a	NS	NS	NA
74	COR Rees	NS	NS	NS

Notes:

- * = Twice-monthly sampling result
- * = Well sampled on quarterly basis, if active
- ND(4) = Not detected at the specified limit
- MUN = Duplicate sample collected from the well listed directly above
- NS = Not sampled (well off line)
- NA = Not analyzed for that compound

TCE = Trichloroethene
 DEL MAR = Del Mar Analytical Laboratory of Irvine, CA
 Perchlorate analyzed using DHS Method (EPA 300.0 Modified)
 TCE analyzed using EPA Method 502.2

TABLE 5

**SUMMARY OF WATER LEVEL MEASUREMENTS
MARCH 1999 SAMPLING EVENT**

HSI#	Well Name	Measure Date	Depth to Water	Measuring Point Elevation	Groundwater Elevation	Comments
City of Loma Linda						
692	Mountain View #2	03/01/99	192	1085	893	Pumping
693	Richardson #1	03/01/99	140	1077	937	Pumping
694	Richardson #2	03/01/99	143	1078	935	Pumping
707	Richardson #3	03/01/99	184	1085	901	Pumping
Southern California Edison						
554	SCE#2(AUX)	NM	NM	1100.00	NM	Pumping
Loma Linda University						
267	LLUniv Anderson #2	NM	NM	1075	NM	Pumping
717	LLUniv Anderson #3	NM	NM	1070	NM	Pumping
City of Riverside (Gage System)						
252	Gage#26-1	03/02/99	61.30	1045.33	984.03	Static
258	Gage#27-1	03/02/99	60.00	1044.64	984.64	Static
259	Gage#27-2	03/02/99	79.80	1044.64	964.84	Pumping
260	Gage#29-1	03/02/99	81.20	1044.43	963.23	Pumping
219	Gage#29-2	03/02/99	78.40	1046.31	967.91	Pumping
220	Gage#29-3	03/02/99	58.20	1048.75	990.55	Static
218	Gage#30-1	03/02/99	88.20	1054.17	965.97	Static
214	Gage#31-1	03/02/99	61.50	1054.64	993.14	Static
215	Gage#46-1	03/02/99	126.60	1065.50	938.90	Pumping
253	Gage#51-1	03/02/99	74.00	1044.64	970.64	Static
216	Gage#56-1	03/02/99	144.50	1065.50	921.00	Pumping
257	Gage#66-1	03/02/99	116.60	1044.85	928.25	Pumping
644	Gage#92-1	03/02/99	139.40	1047.78	908.38	Pumping
641	Gage#92-2	03/02/99	165.20	1053.38	888.18	Pumping
642	Gage#92-3	03/02/99	157.80	1058.78	900.98	Pumping
City of Riverside (Waterman System)						
273	Hunt#6	NM	NM	1015.5	NM	Pumping
271	Hunt#10	NM	NM	1017	NM	Pumping
272	Hunt#11	NM	NM	1015.7	NM	Pumping
City of Redlands						
542	COR Church St	Mar-99	92.0	1344.8	1252.8	Static
2673	COR#38	Mar-99	92.0	NA	NA	Static
535	COR Mentone Acres	Mar-99	143.0	1506.4	1363.4	Static
29	COR Orange st	Mar-99	144.0	1282	1138.0	Static
74	COR Rees	Mar-99	180.0	1490	1310.0	Static

Notes:

All measurements reported in feet below measuring point (ft-bmp)

Water level measurements for all City of Loma Linda, City of Riverside, and City of Redlands wells were obtained by purveyor personnel.

Elevations given in feet above mean sea level (ft-msl)

NM=Not measured

NA=Data not available

Static water levels were allowed to recover a minimum of 30 minutes to obtain a static water level measurement

TABLE 6

**TWICE MONTHLY SAMPLING PROGRAM
THREE MONTH DATA AND AVERAGE
PERCHLORATE CONCENTRATIONS**

Well Name	Sample Date	Sample Result	75% of PAL	PAL
Gage29-2	1/6/99	18	13.5	18
Gage29-2	1/15/99	21	13.5	18
Gage29-2	3/2/99	19	13.5	18
Gage29-2	3/18/99	21	13.5	18
Average 1/1/99 - 3/31/99*		19.8		
Gage29-3	Not Sampled Between 1/1/99 and 3/31/99			
COLL Mountain View #2	1/5/99	24	13.5	18
COLL Mountain View #2	1/19/99	8.9	13.5	18
COLL Mountain View #2	2/2/99	4.8	13.5	18
COLL Mountain View #2	2/16/99	5.1	13.5	18
COLL Mountain View #2	3/18/99	8.8	13.5	18
Average 1/1/99 - 3/31/99*		10.3		

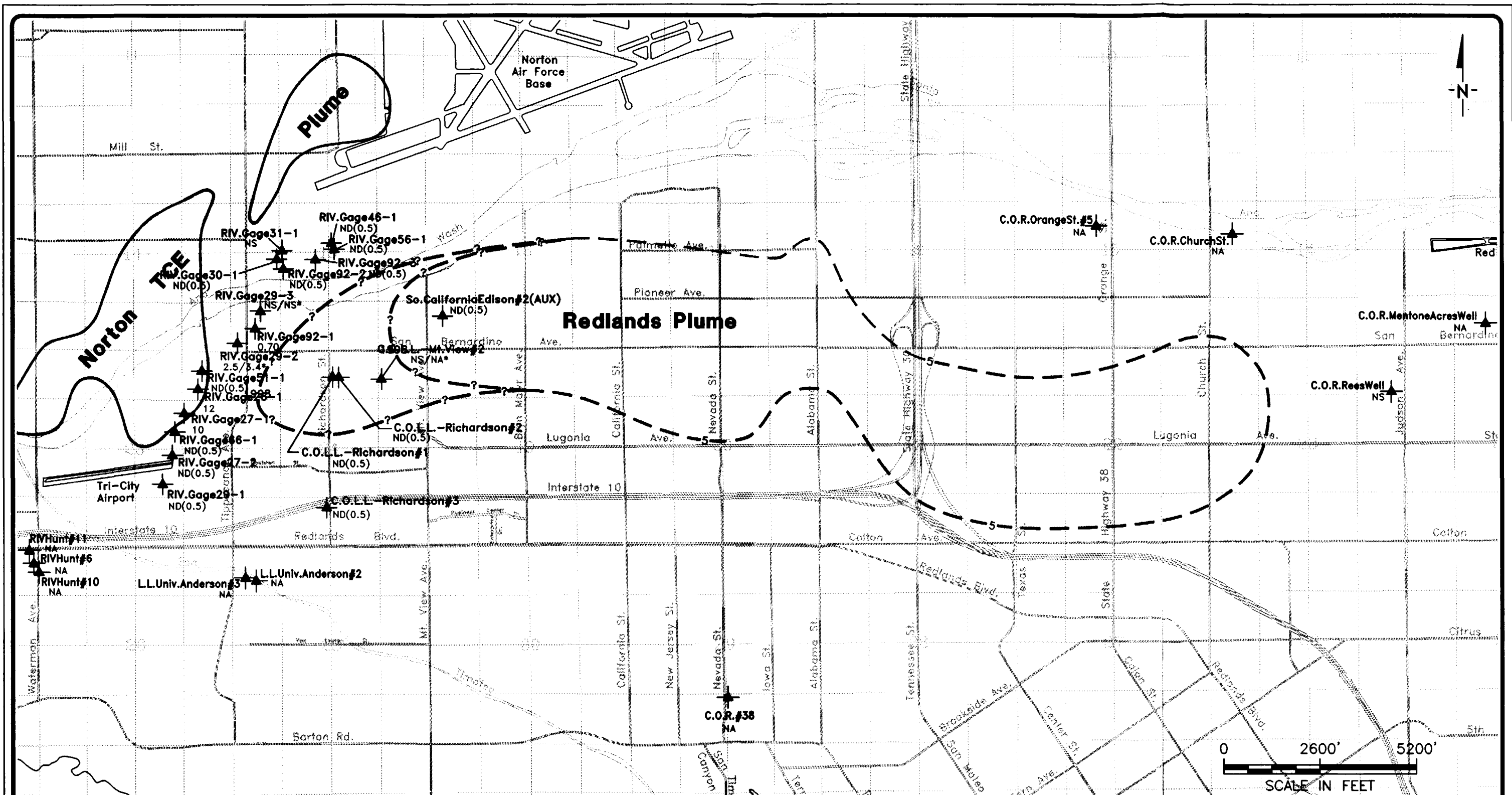
Notes:

* Well sometimes off-line between 1/1/99 - 3/31/99

All concentrations are micrograms per liter.

PAL = Provisional Action Level for perchlorate

FIGURES



EXPLANATION

Wells Currently Sampled Under the Existing WSCP Sampling Program

12 TCE Results ($\mu\text{g/L}$)

- Approximate TCE Plume Location 5 $\mu\text{g/L}$ (1998 interpretation of Redlands Plume)
- Approximate TCE Plume Location 5 $\mu\text{g/L}$ (1998 interpretation of Norton AFB Plume, by Norton)
- Project 5 $\mu\text{g/L}$ TCE Contour in Hydrostratigraphic Unit 2
- Project 5 $\mu\text{g/L}$ TCE Contour in Hydrostratigraphic Unit 4

ND(0.5) Not Detected at Indicated Detection Limit

NS Not Sampled

NA Not Analyzed

* Twice-Monthly Sampling Results

ND(0.5) C.O.L.L. Mountain View Blend at Lawton
ND(0.5) C.O.L.L. Mountain View Blend at Timoteo
ND(0.5) C.O.L.L. Richardson Blend
ND(0.5) Riv. Iowa Booster (Waterman)
ND(0.5) Riv. Gage Delivery (Gage)
ND(0.5) Riv. 7th + Chicago (Reservoir)
NA Gage Arlington

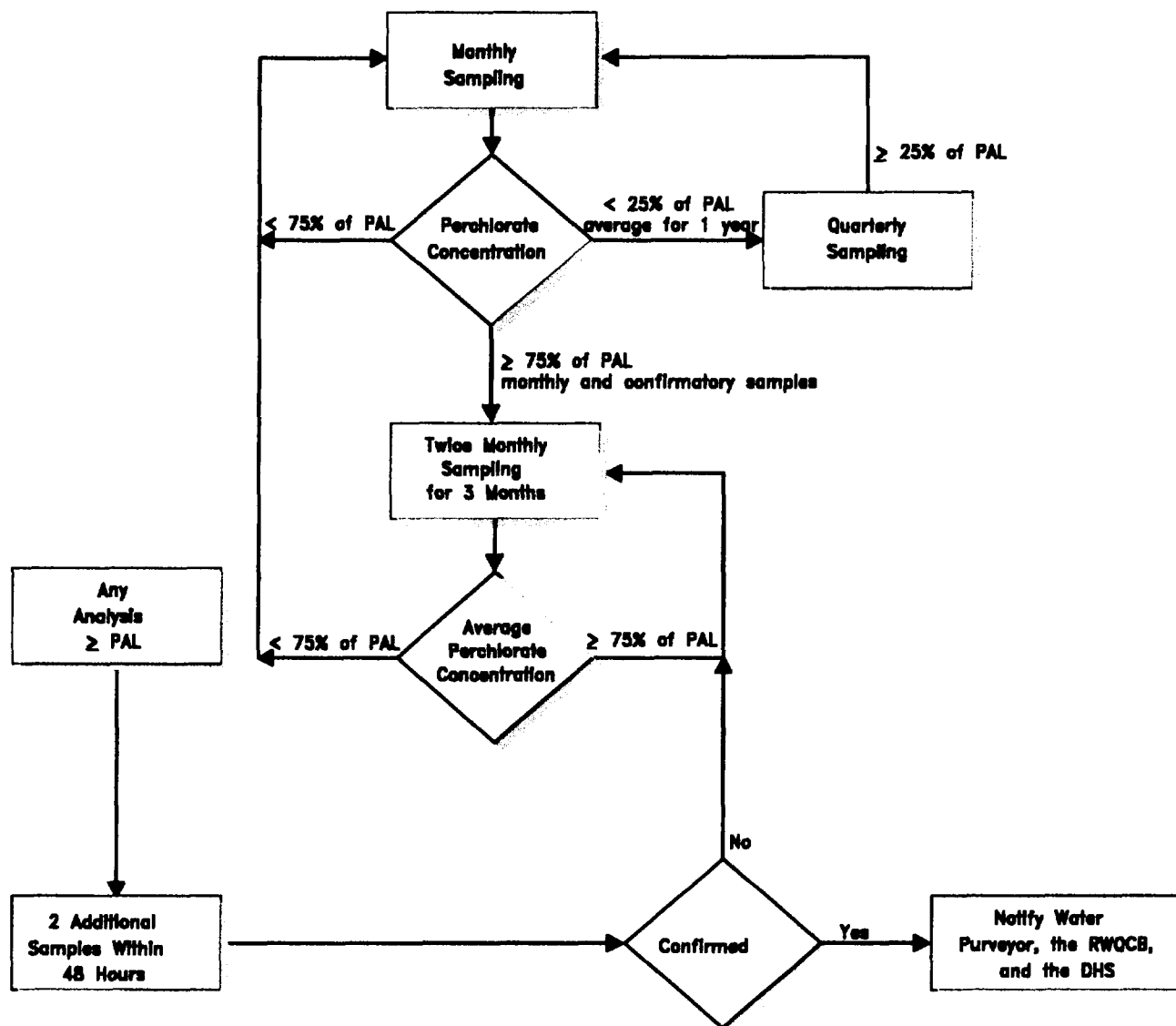
TITLE: WSCP Production Well Sampling Program
TCE Data Results March 1999

LOCATION: LOCKHEED MARTIN
REDLANDS, CALIFORNIA

HSI GEOTRANS
A TETRA TECH COMPANY


CHECKED: Roy Marroquin
DRAFTED: Hector Magaña
PROJ.: C541-101
DATE: 03/31/99

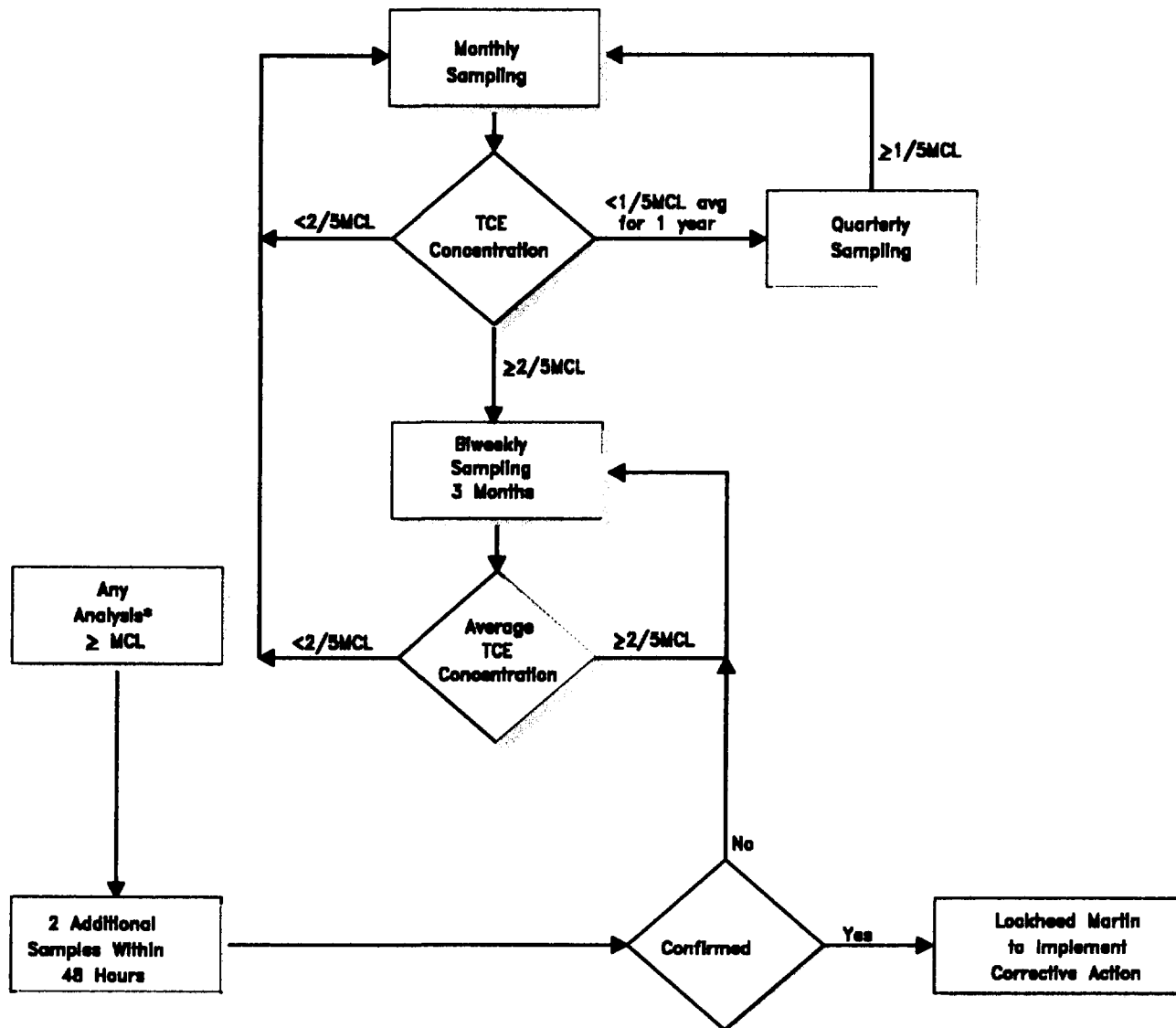
FIGURE:
1



Footnote:

Perchlorate Provisional Action Level (PAL) = 18 µg/L (California Department of Health Services, May 1997)

TITLE:		Decision Matrix for Sampling Production Wells for Perchlorate	
LOCATION:		LOCKHEED MARTIN REDLANDS, CALIFORNIA	
 HSI GEOTRANS A TETRA TECH COMPANY	CHECKED:	Ron Bruns	FIGURE: 3
	DRAFTED:	Hector Magaña	
	PROJ.:	C541-101	
DATE:		09/25/98	



Footnote:

* If, at a specific well, blending is occurring to provide acceptable water for compounds other than TCE, then no corrective action may be necessary as long as the concentration of TCE is less than 5.0 µg/L in the finished water.

TCE MCL = 5 µg/L (California Regulations, Title 22, Division 4, Chapter 15, Section 64444)

TITLE: Decision Matrix for Sampling of Production Wells for TCE from the Crafton-Redlands Plume

LOCATION: LOCKHEED MARTIN
REDLANDS, CALIFORNIA



CHECKED:	Ron Bruns
DRAFTED:	Hector Magaña
PROJ.:	C541-101
DATE:	09/25/98

FIGURE:
4

ATTACHMENT A
GEOLIS FIELD FORMS

ATTACHMENT A

GEOLIS FIELD FORMS
(Available Upon Request)

ATTACHMENT B

**CHAIN-OF-CUSTODY RECORDS AND
LABORATORY DATA SHEETS**

ATTACHMENT B

**CHAIN-OF-CUSTODY RECORDS AND
LABORATORY DATA SHEETS**
(Available Upon Request)

ATTACHMENT C

LEVEL III

QUALITY ASSURANCE/QUALITY CONTROL DOCUMENTATION

ATTACHMENT C

LEVEL III

QUALITY ASSURANCE/QUALITY CONTROL DOCUMENTATION
(Available Upon Request)